

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C

OF

Product Name: Coswe
Brand Name: EcoLumina
Model No.: 0504-S01101A100011
Model Difference: N/A
FCC ID: R59-0504S01101
Report No.: ER/2012/90021
Issue Date: Nov. 02, 2012
FCC Rule Part: §15.249
Prepared for: EcoLumina Technologies Inc.
4F., No. 225, Sec. 3, Beixin Rd., Xindian Dist., New
Taipei City 23143, Taiwan R.O.C.
SGS Taiwan Ltd.
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Prepared by: No.134, Wu Kung Road, New Taipei Industrial
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VERIFICATION OF COMPLIANCE

Applicant: EcoLumina Technologies Inc.
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 23143, Taiwan R.O.C.

Product Name: Coswe

FCC ID: R59-0504S01101

Brand Name: EcoLumina

Model No.: 0504-S01101A100011

Model Difference: N/A

File Number: ER/2012/90021

Date of test: Sep. 19, 2012 ~ Oct. 30, 2012

Date of EUT Received: Sep. 19, 2012

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd., Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.249.

The test results of this report relate only to the tested sample identified in this report.

Test By: *Marcus Tseng* **Date:** Nov. 02, 2012

Marcus Tseng / Engineer

Prepared By: *Tiffany Kao* **Date:** Nov. 02, 2012

Tiffany Kao / Clerk

Approved By: *Jim Chang* **Date:** Nov. 02, 2012

Jim Chang / Supervisor

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Version

Version No.	Date	Description
00	Nov. 02, 2012	Initial creation of document

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8.3 MEASUREMENT EQUIPMENT USED:34

8.4 MEASUREMENT RESULTS:34

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1. GENERAL INFORMATION

1.1. Product Description

Product Name:	Coswe
Brand Name:	EcoLumina
Model No.:	0504-S01101A100011
Model Difference:	N/A
Operation Frequency:	2405~2480MHz
Channel number:	16 channels
Channel Spacing:	5MHz
Modulation Type:	QPSK
Power Supply:	110 / 220 VAC from Test Kit
Antenna Designation:	PIFA Antenna / 5.0dBi

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1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: R59-0504S01101** filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2009). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2009. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-4.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. Equipment Modifications

Not available for this EUT intended for grant.

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2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The Transmitter was operated in the engineering operating mode. the Tx frequency was fixed at 2405, 2445 and 2480 MHz which were for the purpose of the measurements.

2.3. Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.4-2009.

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2.4. Limitation

(1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 - 56	56 - 46
0.5 – 5	56	46
5 - 30	60	50

(2) Radiated Emission 15.249(a)

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following.

Frequency (MHz)	Field strength of Fundamental	Field strength of Harmonics	Distance (m)
902 - 928	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
2400 – 2483.5	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
5725 – 5875	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3

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(3) Radiated Emission 15.249 (d).

Emission Radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in Section 15.209 as below, whichever is the lesser attenuation.

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance (m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

(4) Radiated Emission 15.249(e).

For frequencies above 1000MHz, the above field strength limits are based on average limits. The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation.

- Remark:
1. Emission level in $\text{dB}\mu\text{V/m} = 20 \log(\mu\text{V/m})$
 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205
 4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of ξ 15.205, then the general radiated emission limits in ξ 15.209 apply.

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2.5. Configuration of Tested System

Fig. 2-1 configuration

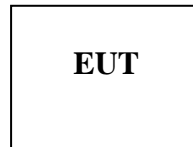


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	N/A					

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

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3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207	Conducted Emission	Compliant
§15.249(a)(d)(e)	Field Strength Measurement	Compliant
§15.215(c)	20dB band width Measurement	Compliant

4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receive mode is programmed.

Channel low (2405MHz) 、mid (2440MHz) and high (2480MHz) with highest data rate are chosen for full testing.

5. MEASUREMENT UNCERTAINTY FOR FIELD STRENGTH OF SPURIOUS RADIATION

Measurement uncertainty (Polarization : Vertical)	30MHz - 180MHz: 3.37dB
	180MHz -417MHz: 3.19dB
	0.417GHz-1GHz: 3.19dB
	1GHz - 18GHz: 4.04dB
	18GHz - 40GHz: 4.04dB

Measurement uncertainty (Polarization : Horizontal)	30MHz - 167MHz: 4.22dB
	167MHz -500MHz: 3.44dB
	0.5GHz-1GHz: 3.39dB
	1GHz - 18GHz: 4.08dB
	18GHz - 40GHz: 4.08dB

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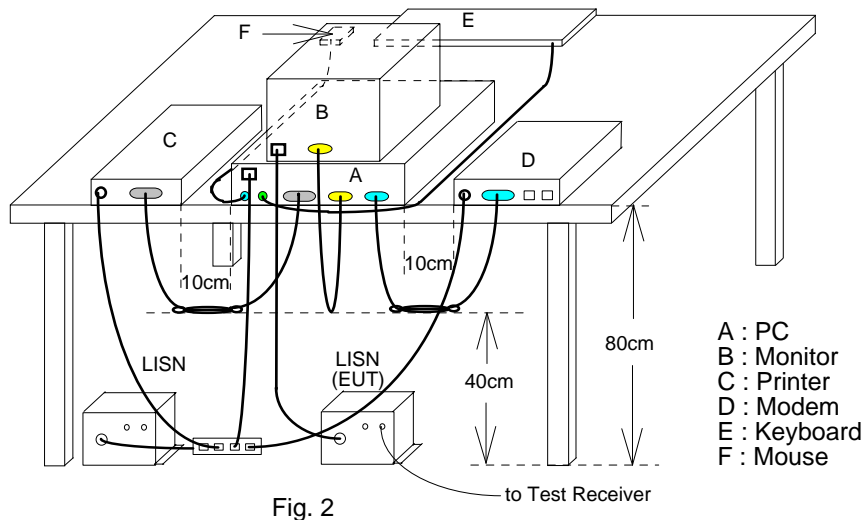
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6. CONDUCTED EMISSIONS TEST

6.1 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

6.2 Test SET-UP (Block Diagram of Configuration)



6.3 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100759	05/20/2011	05/19/2013
EMI Receiver	R&S	ESCS 30	828985/004	09/23/2012	09/22/2013
LISN	Rolf-Heine	NNB-2/16Z	99012	03/23/2012	03/22/2013
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/23/2012	03/22/2013
Coaxial Cables	N/A	WK CE Cable	N/A	01/05/2012	01/04/2013

6.4 Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Result: Refer to next page for measurement data and plots.

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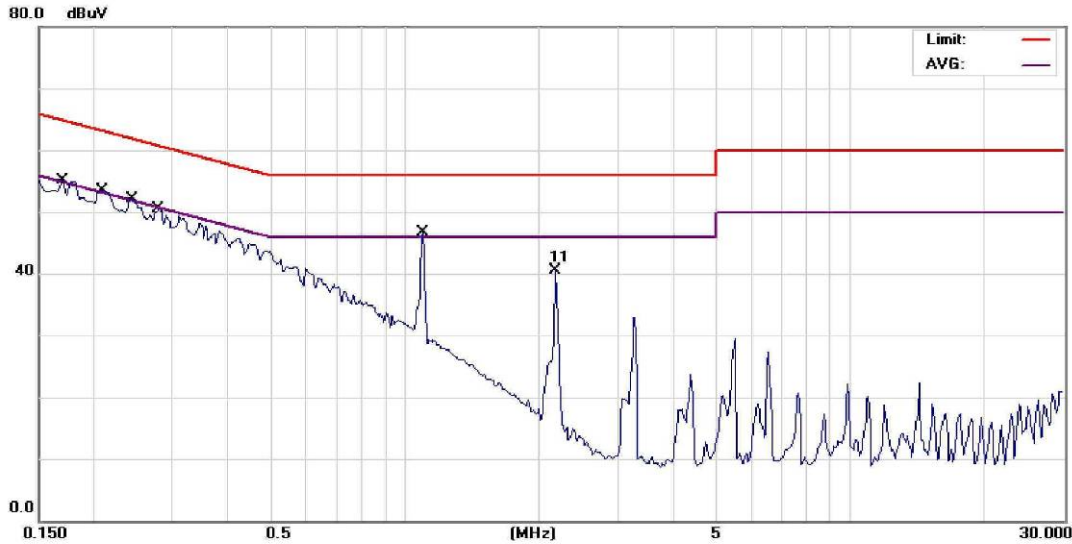
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode			Test Date:	Oct. 29, 2012
Temperature:	26 °C	Humidity:	59 %	Test By:	Marcus



Site: ConductionRoom Phase: L1 Temperature: 26 °C
 Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 60%
 EUT: Coswe Distance:
 M/N: 0504-S01101A100011
 Mode: Charger mode
 Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1693	46.46	0.33	46.79	64.99	-18.20	QP	
2		0.1693	25.05	0.33	25.38	54.99	-29.61	AVG	
3		0.2083	45.16	0.31	45.47	63.27	-17.80	QP	
4		0.2083	22.06	0.31	22.37	53.27	-30.90	AVG	
5		0.2428	43.68	0.31	43.99	62.00	-18.01	QP	
6		0.2428	20.75	0.31	21.06	52.00	-30.94	AVG	
7		0.2785	42.34	0.32	42.66	60.86	-18.20	QP	
8		0.2785	19.42	0.32	19.74	50.86	-31.12	AVG	
9	*	1.0937	42.40	0.31	42.71	56.00	-13.29	QP	
10		1.0937	31.10	0.31	31.41	46.00	-14.59	AVG	
11		2.1813	40.20	0.33	40.53	56.00	-15.47	peak	

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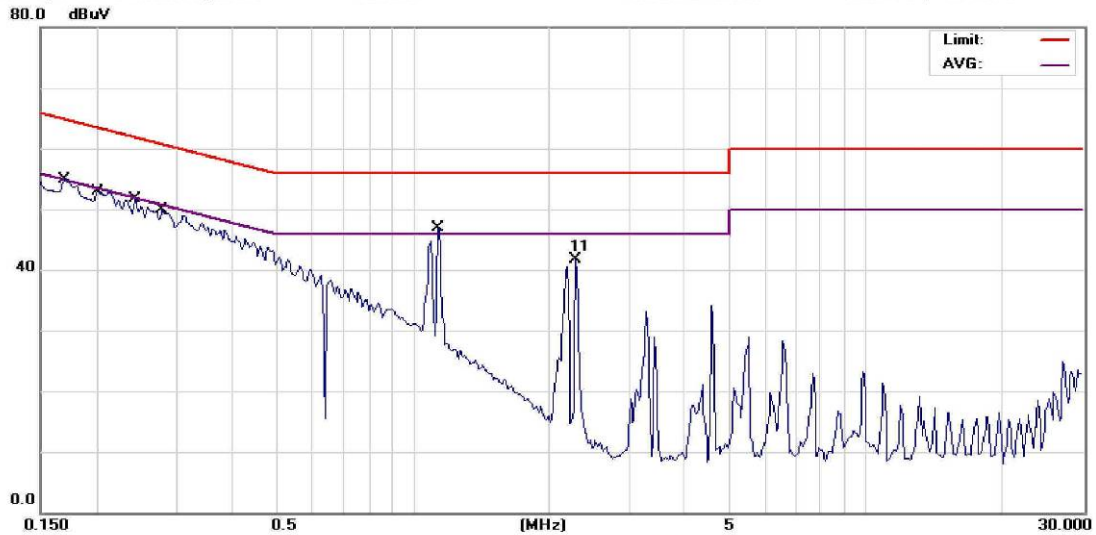
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Site: ConductionRoom
 Limit: FCC Class B Conduction(QP)
 EUT: Coswe
 M/N: 0504-S01101A100011
 Mode: Charger mode
 Note:

Phase: N
 Power: AC 120V/60Hz
 Distance:

Temperature: 26 °C
 Humidity: 60%

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1692	46.58	0.33	46.91	65.00	-18.09	QP	
2		0.1692	24.19	0.33	24.52	55.00	-30.48	AVG	
3		0.2005	44.60	0.31	44.91	63.59	-18.68	QP	
4		0.2005	22.56	0.31	22.87	53.59	-30.72	AVG	
5		0.2431	43.39	0.31	43.70	61.99	-18.29	QP	
6		0.2431	21.02	0.31	21.33	51.99	-30.66	AVG	
7		0.2784	42.02	0.32	42.34	60.86	-18.52	QP	
8		0.2784	19.60	0.32	19.92	50.86	-30.94	AVG	
9		1.1367	21.10	0.31	21.41	56.00	-34.59	QP	
10		1.1367	6.40	0.31	6.71	46.00	-39.29	AVG	
11	*	2.2869	41.29	0.33	41.62	56.00	-14.38	peak	

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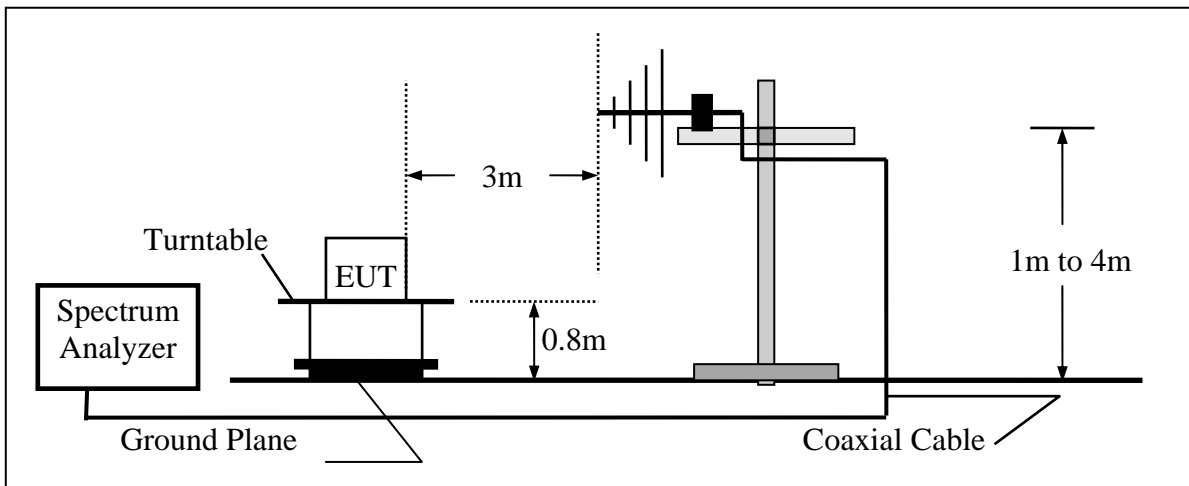
7. RADIATED EMISSION TEST

7.1 Measurement Procedure

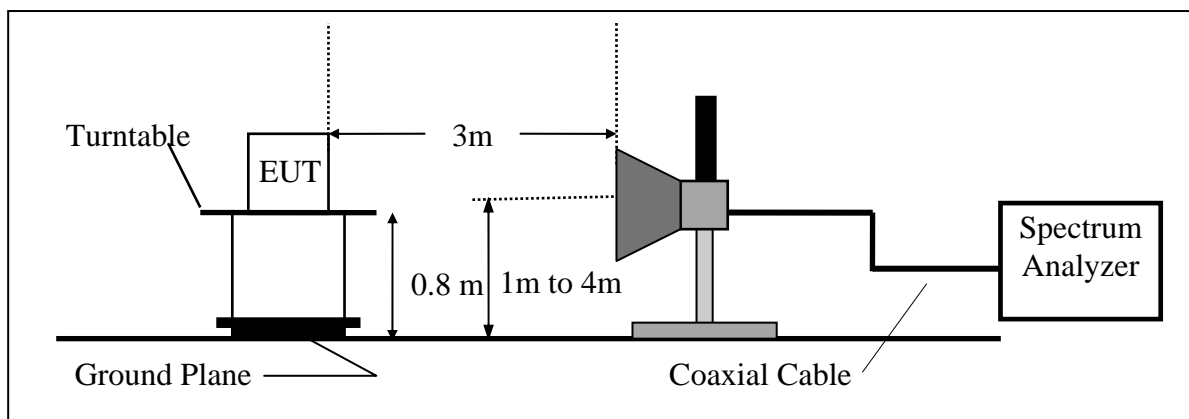
1. The EUT was placed on a turntable that is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

7.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



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7.3 Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100759	05/20/2011	05/19/2013
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/15/2011	04/14/2013
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	02/15/2011	02/14/2013
Spectrum Analyzer	R&S	FSV-30	101398	10/18/2011	10/17/2013
Bilog Antenna	SCHWAZBECK	VULB9168	378	01/10/2012	01/09/2014
Horn antenna	ETS.LINDGREN	3117	123995	05/19/2011	05/18/2013
Horn Antenna	Schwarzbeck	BBHA9170	185	07/11/2011	07/10/2013
Pre-Amplifier	Agilent	8447D	2944A07676	01/04/2012	01/03/2013
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/04/2012	01/03/2013
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M2	02/28/2012	02/28/2013
Attenuator	Mini-Circuit	BW-S10W2+	004	02/28/2012	02/27/2013
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_Rx	9	01/04/2012	01/03/2013
3m Site NSA	SGS	966 chamber	N/A	07/15/2012	07/14/2013

7.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

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7.5 Measurement Result

Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2405 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:MAIN	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2405.00	F	Average	43.44	2.17	45.61	94.00	-48.39
2405.00	F	Peak	92.29	2.17	94.46	114.00	-19.54

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2405 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:MAIN	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2405.00	F	Average	45.58	2.85	48.43	94.00	-45.57
2405.00	F	Peak	90.55	2.85	93.40	114.00	-20.60

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2445 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:MAIN	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2445.00	F	Average	43.60	2.39	45.99	94.00	-48.01
2445.00	F	Peak	90.16	2.39	92.55	114.00	-21.45

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2445 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:MAIN	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2445.00	F	Average	43.10	3.26	46.36	94.00	-47.64
2445.00	F	Peak	87.54	3.26	90.80	114.00	-23.20

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2480 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:MAIN	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2480.00	F	Average	43.32	2.52	45.84	94.00	-48.16
2480.00	F	Peak	86.66	2.52	89.18	114.00	-24.82

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2480 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:MAIN	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμ V/m) = SPA. Reading level(dBμ V) + Factor(dB)

Factor(dB) = Antenna Factor(dBμ V/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμ V	dB	dBμ V/m	dBμ V/m	dB
2480.00	F	Average	43.20	3.53	46.73	94.00	-47.27
2480.00	F	Peak	84.54	3.53	88.07	114.00	-25.93

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2405 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:BANDEDGE LOW	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	40.34	2.12	42.46	54.00	-11.54
2390.00	E	Peak	51.23	2.12	53.35	74.00	-20.65

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2405 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:BANDEDGE LOW	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	41.29	2.74	44.03	54.00	-9.97
2390.00	E	Peak	51.17	2.74	53.91	74.00	-20.09

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2480 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:BANDEDGE HIGH	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	42.47	2.53	45.00	54.00	-9.00
2483.50	E	Peak	53.76	2.53	56.29	74.00	-17.71

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2480 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:BANDEDGE HIGH	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	41.38	3.56	44.94	54.00	-9.06
2483.50	E	Peak	51.38	3.56	54.94	74.00	-19.06

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Radiated Spurious Emission Measurement Result

Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2405 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:TX LOW	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
36.79	S	Peak	35.48	-13.86	21.62	40.00	-18.38
99.84	S	Peak	34.44	-16.84	17.60	43.50	-25.90
240.49	S	Peak	37.70	-14.19	23.51	46.00	-22.49
312.27	S	Peak	33.71	-12.27	21.44	46.00	-24.56
538.28	S	Peak	29.91	-8.81	21.10	46.00	-24.90
917.55	S	Peak	27.38	-2.47	24.91	46.00	-21.09
4810.00	H	Average	25.80	7.02	32.82	54.00	-21.18
4810.00	H	Peak	43.86	7.02	50.88	74.00	-23.12
7215.00	H	---					
9620.00	H	---					
12025.00	H	---					
14430.00	H	---					
16835.00	H	---					
19240.00	H	---					
21645.00	H	---					
24050.00	H	---					

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2405 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:TX LOW	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
174.53	S	Peak	31.30	-13.76	17.54	43.50	-25.96
240.49	S	Peak	39.46	-14.19	25.27	46.00	-20.73
312.27	S	Peak	35.89	-12.27	23.62	46.00	-22.38
522.76	S	Peak	29.12	-9.15	19.97	46.00	-26.03
717.73	S	Peak	28.48	-5.46	23.02	46.00	-22.98
935.01	S	Peak	27.68	-2.24	25.44	46.00	-20.56
4810.00	H	Average	25.18	7.05	32.23	54.00	-21.77
4810.00	H	Peak	40.11	7.05	47.16	74.00	-26.84
7215.00	H	---					
9620.00	H	---					
12025.00	H	---					
14430.00	H	---					
16835.00	H	---					
19240.00	H	---					
21645.00	H	---					
24050.00	H	---					

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2445 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:TX MID	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
36.79	S	Peak	35.04	-13.86	21.18	40.00	-18.82
99.84	S	Peak	34.73	-16.84	17.89	43.50	-25.61
239.52	S	Peak	38.79	-14.21	24.58	46.00	-21.42
312.27	S	Peak	33.55	-12.27	21.28	46.00	-24.72
682.81	S	Peak	28.44	-5.98	22.46	46.00	-23.54
942.77	S	Peak	27.75	-2.16	25.59	46.00	-20.41
4890.00	H	Average	25.77	7.17	32.94	54.00	-21.06
4890.00	H	Peak	43.19	7.17	50.36	74.00	-23.64
7335.00	H	---					
9780.00	H	---					
12225.00	H	---					
14670.00	H	---					
17115.00	H	---					
19560.00	H	---					
22005.00	H	---					
24450.00	H	---					

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2445 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:TX MID	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
240.49	S	Peak	39.56	-14.19	25.37	46.00	-20.63
312.27	S	Peak	35.62	-12.27	23.35	46.00	-22.65
471.35	S	Peak	27.73	-9.90	17.83	46.00	-28.17
563.50	S	Peak	28.27	-8.31	19.96	46.00	-26.04
776.90	S	Peak	27.94	-4.52	23.42	46.00	-22.58
926.28	S	Peak	27.58	-2.31	25.27	46.00	-20.73
4890.00	H	Average	25.52	7.10	32.62	54.00	-21.38
4890.00	H	Peak	38.87	7.10	45.97	74.00	-28.03
7335.00	H	---					
9780.00	H	---					
12225.00	H	---					
14670.00	H	---					
17115.00	H	---					
19560.00	H	---					
22005.00	H	---					
24450.00	H	---					

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2480 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
36.79	S	Peak	34.95	-13.86	21.09	40.00	-18.91
239.52	S	Peak	38.22	-14.21	24.01	46.00	-21.99
312.27	S	Peak	33.49	-12.27	21.22	46.00	-24.78
511.12	S	Peak	28.12	-9.38	18.74	46.00	-27.26
649.83	S	Peak	28.27	-6.60	21.67	46.00	-24.33
807.94	S	Peak	27.65	-4.10	23.55	46.00	-22.45
4960.00	H	Average	25.62	7.17	32.79	54.00	-21.21
4960.00	H	Peak	42.04	7.17	49.21	74.00	-24.79
7440.00	H	---					
9920.00	H	---					
12400.00	H	---					
14880.00	H	---					
17360.00	H	---					
19840.00	H	---					
22320.00	H	---					
24800.00	H	---					

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Operation Band	:Zigbee	Test Date	:2012-10-25
Fundamental Frequency	:2480 MHz	Temp./Humi.	:23.7 deg_C / 57 RH
Operation Mode	:TX HIGH	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.

“---“ : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
240.49	S	Peak	39.53	-14.19	25.34	46.00	-20.66
312.27	S	Peak	37.81	-12.27	25.54	46.00	-20.46
336.52	S	Peak	30.34	-11.83	18.51	46.00	-27.49
622.67	S	Peak	28.15	-7.06	21.09	46.00	-24.91
724.52	S	Peak	28.01	-5.37	22.64	46.00	-23.36
891.36	S	Peak	28.09	-2.98	25.11	46.00	-20.89
4960.00	H	Average	25.32	7.02	32.34	54.00	-21.66
4960.00	H	Peak	37.85	7.02	44.87	74.00	-29.13
7440.00	H	---					
9920.00	H	---					
12400.00	H	---					
14880.00	H	---					
17360.00	H	---					
19840.00	H	---					
22320.00	H	---					
24800.00	H	---					

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8. 20 dB BAND WIDTH MEASUREMENT

8.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set ETU normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW = 100kHz, VBW = 300kHz, Span = 5MHz.
4. Set SPA Max hold. Mark peak, -20dB.

8.2 Test SET-UP (Block Diagram of Configuration)

Same as 7.2 Radiated Emission Measurement.

8.3 Measurement Equipment Used:

Same as 7.3 Radiated Emission Measurement.

8.4 Measurement Results:

2405 Channel = 2.423MHz

2440 Channel = 2.448MHz

2480 Channel = 2.440MHz

Refer to attached data chart.

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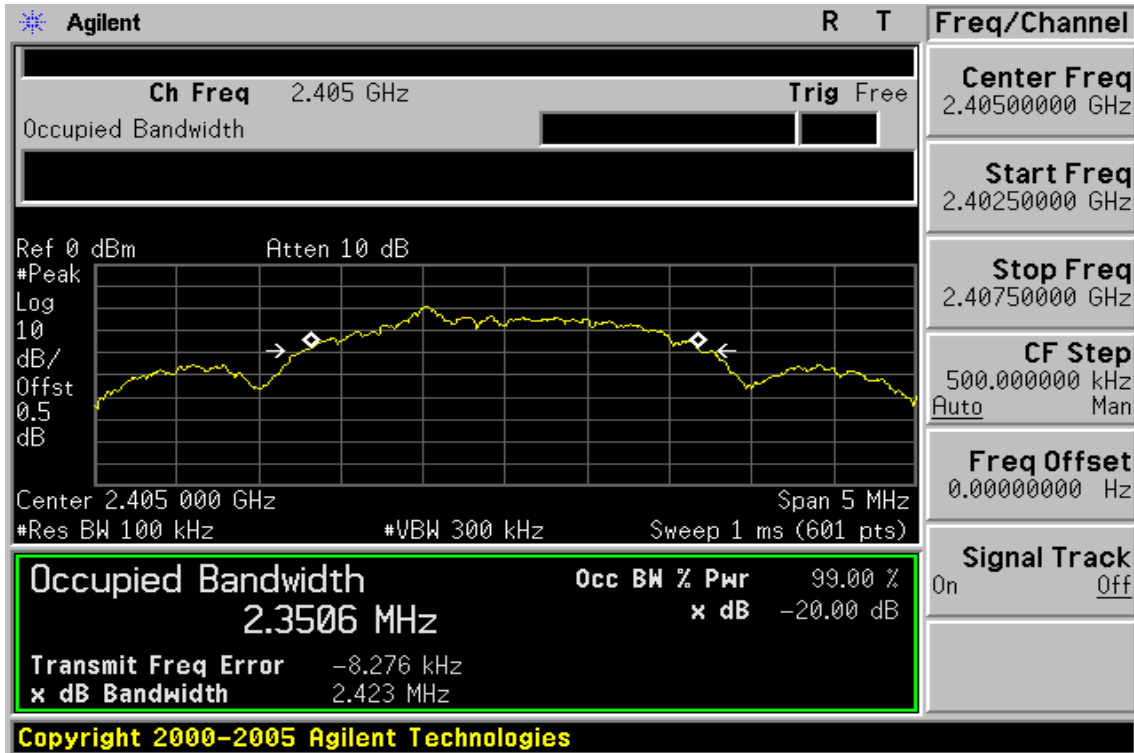
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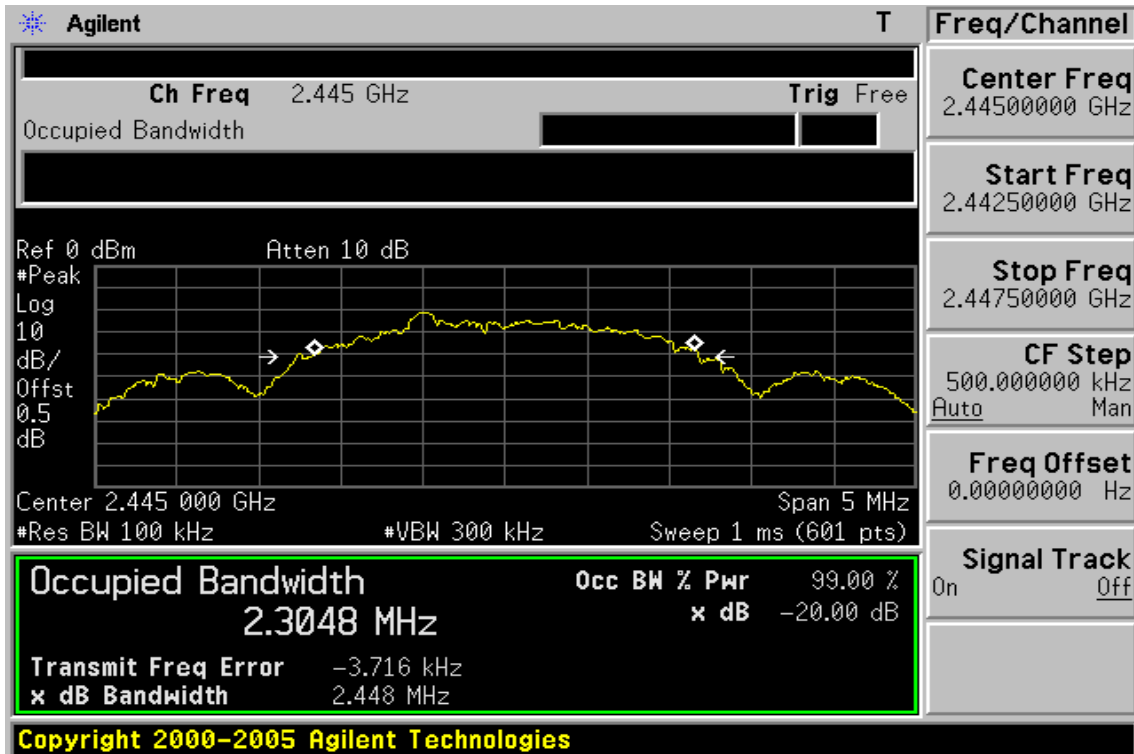
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20dB Bandwidth Test Data CH-Low



20dB Bandwidth Test Data CH-Mid



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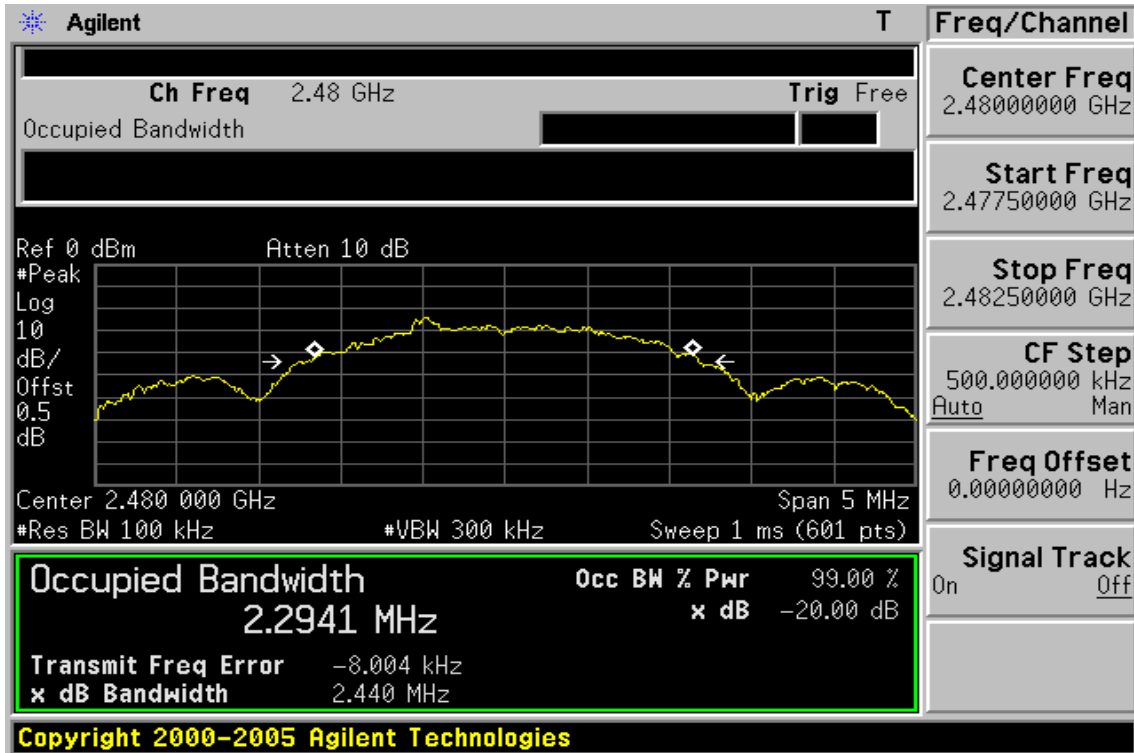
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20dB Bandwidth Test Data CH-High



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